Mountain Pine Beetle and Fire

The British Columbia Experience

FOREST SERVICE
WILDFIRE MANAGEMENT
BRITISH COLUMBIA

Presentation Outline

1. Mountain Pine Beetle (MPB) overview in BC
2. Fire in the Red stage of the MPB killed stands
3. Fire in the Gray stage of MPB killed stands
4. Quantifying Fire Behaviour
   - Spotting
   - Fuel Models
   - Intensity and Severity
5. Fireline Safety
6. What is happening in the BC forests post attack
7. Environmental and Social Change
   - Climate Change
   - Harvest Practises
   - Community Security
   - Public Safety
   - Pressures – Political and Industry
8. Future???

Forestry Facts of British Columbia

- Total area of 95 million ha or 234.65 million acres
- Forested Area of 60 million ha or 148.2 million acres and more than 90% publicly owned
- 96% of the forested land is comprised of conifer species, giving BC approximately half of Canada's softwood inventory
- Non-timber uses of BC's forest lands, such as for range and grazing, recreation, watershed protection, wildlife habitat and visual enjoyment, are part of a continuing emphasis by the provincial government on integrated resources management.
- Recreational use of forest and wilderness area is an important component of the tourism industry. Forest land generates revenue from cattle-grazing and community watershed fees, and from licenses for guiding, outfitting, hunting and fishing

MPB History in BC
(Current infestation 1997 – 2009)

The mountain pine beetle has now killed a cumulative total of 675 million cubic metres or 202.5 billion board feet of timber since the current infestation began. (202.5 billion board feet of lumber equals close to 38 billion 2x4 studs)

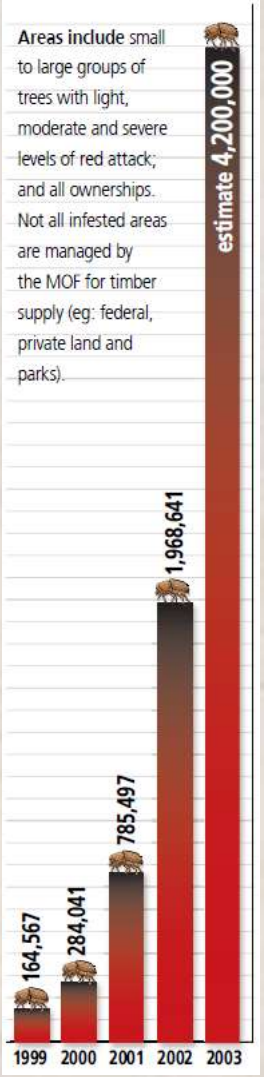
The cumulative area of B.C. affected to some degree (red-attack and grey-attack) is estimated at 16.3 million hectares or 40.3 million acres.

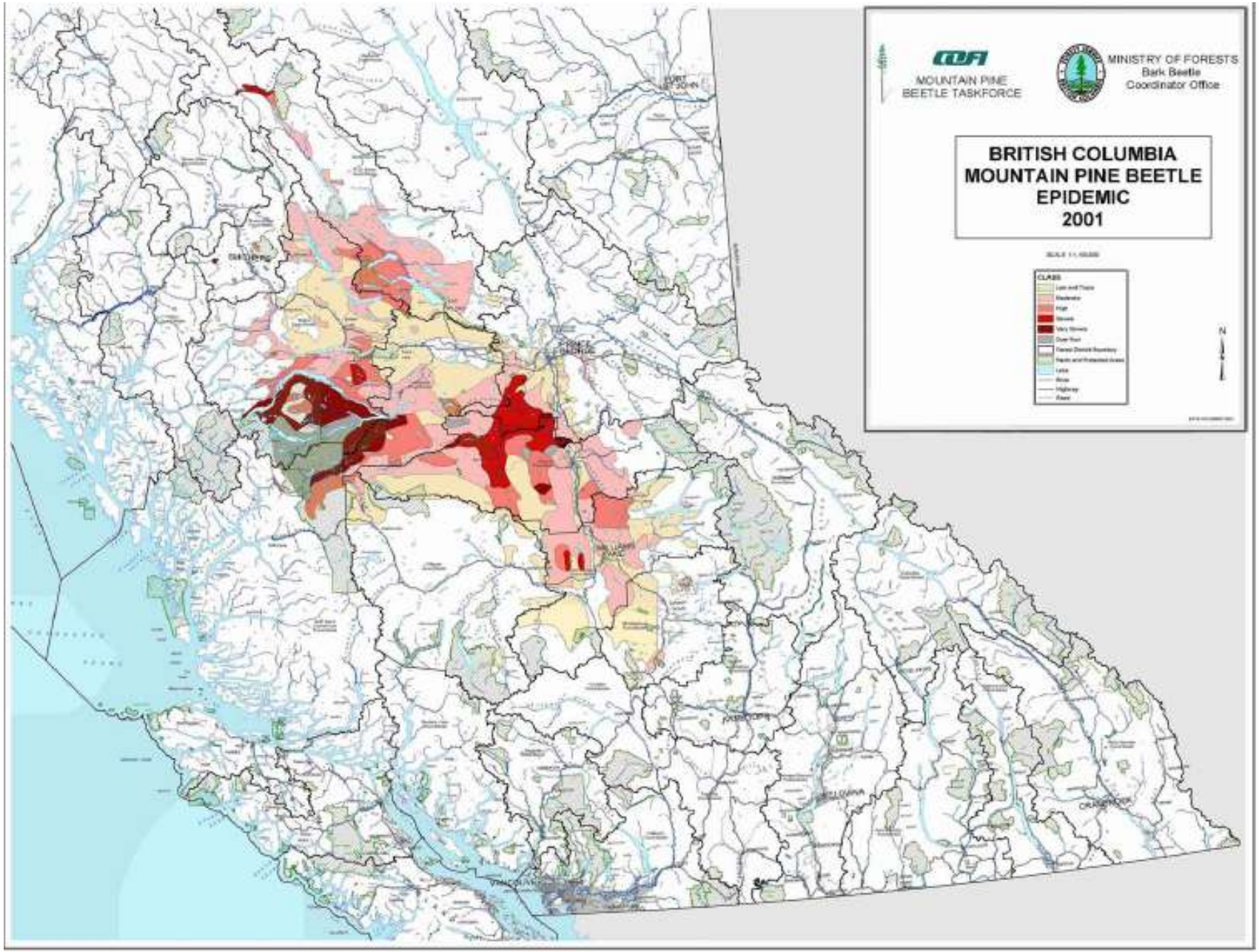
40.3 million acres is nearly double the size of Montana's forested land

(based on a forested land base of 22.5 million acres)

On a provincial level, the infestation peaked in terms of volume killed annually in 2005 and has slowed considerably since then.

The mountain pine beetle in B.C. is as far-ranging as Fort St. John to the north, the Alberta border to the east, Terrace to the west, and the United States border to the south.

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BEETLE TASKFORCE
MINISTRY OF FORESTS
Bark Beetle
Coordinator Office
BRITISH COLUMBIA
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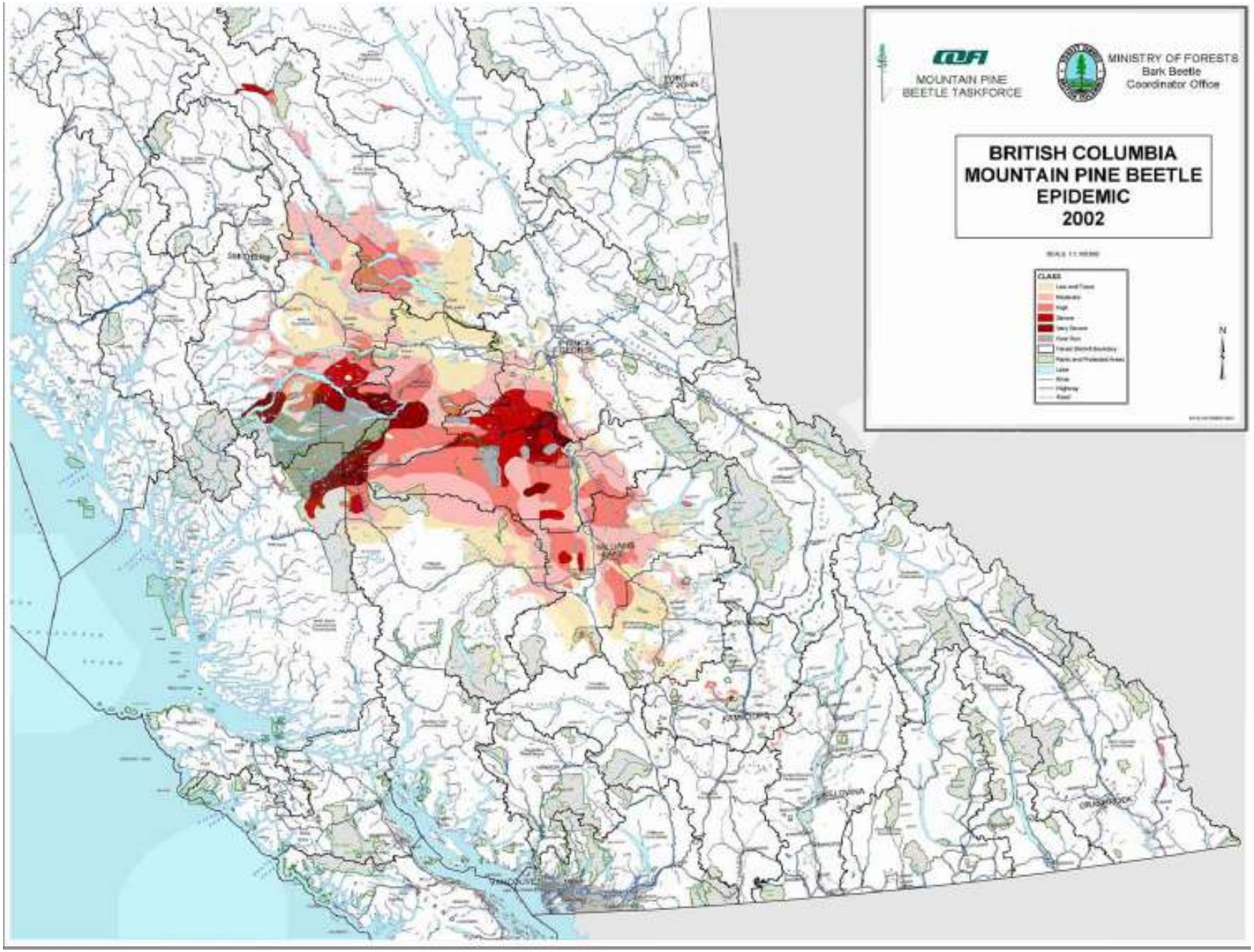
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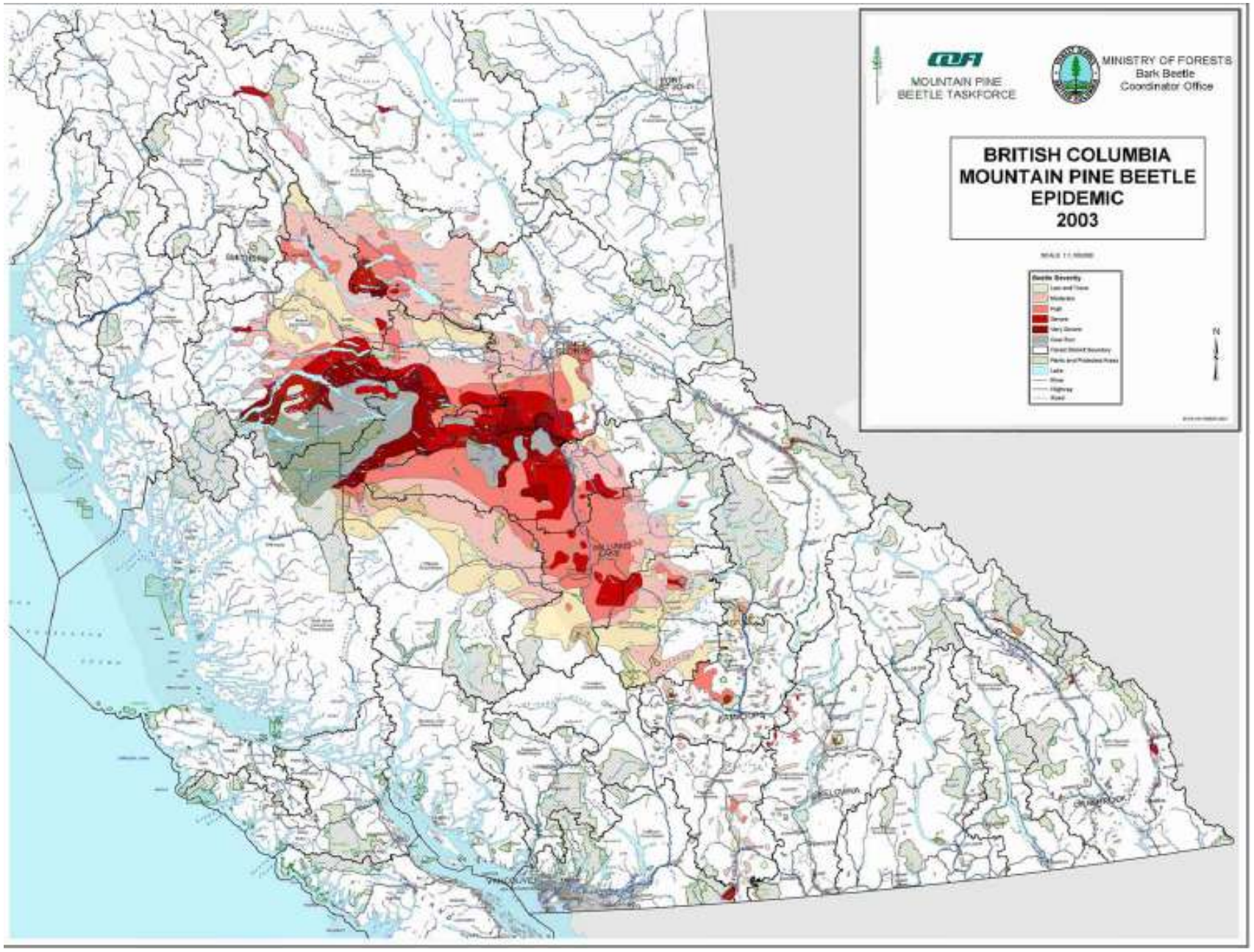
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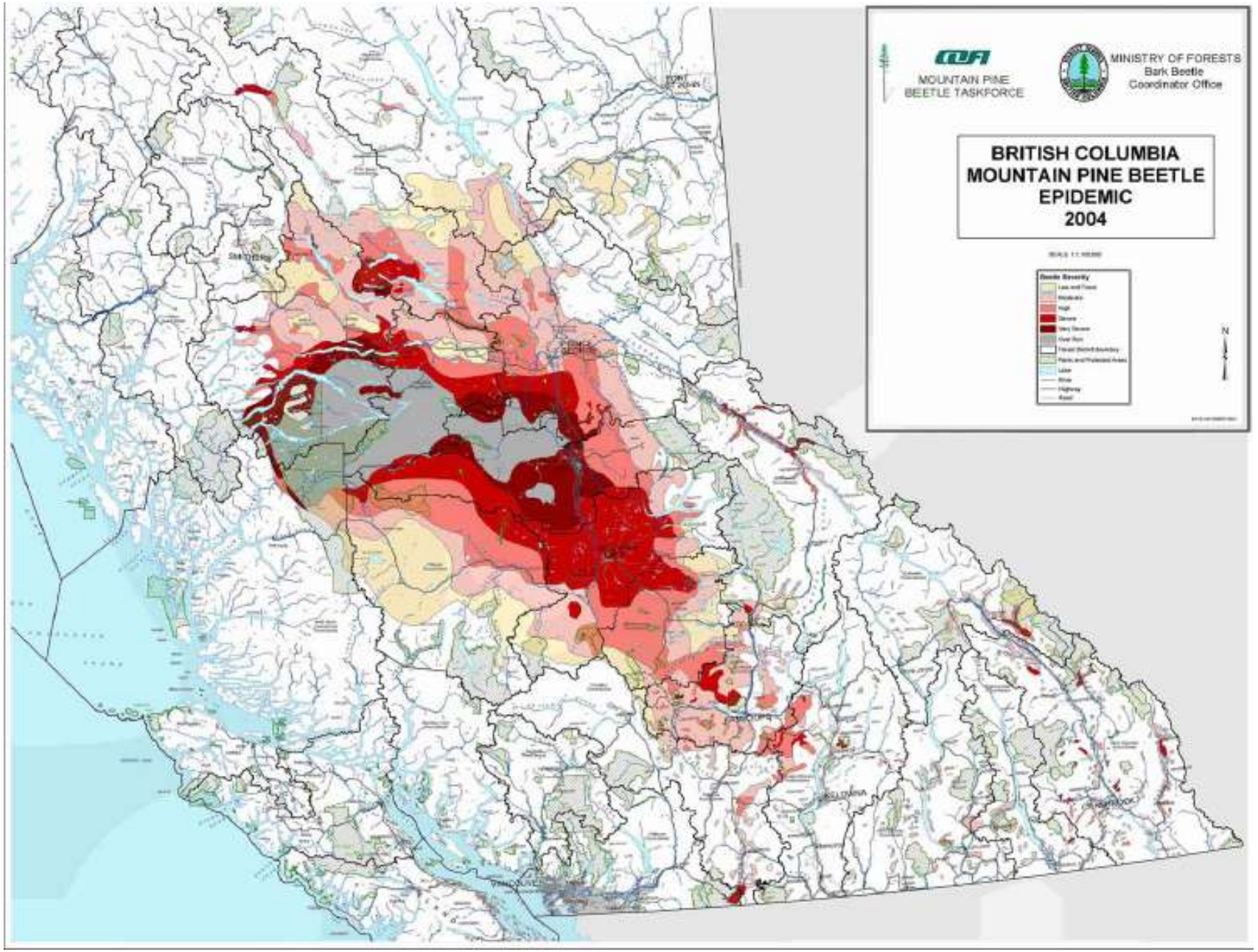
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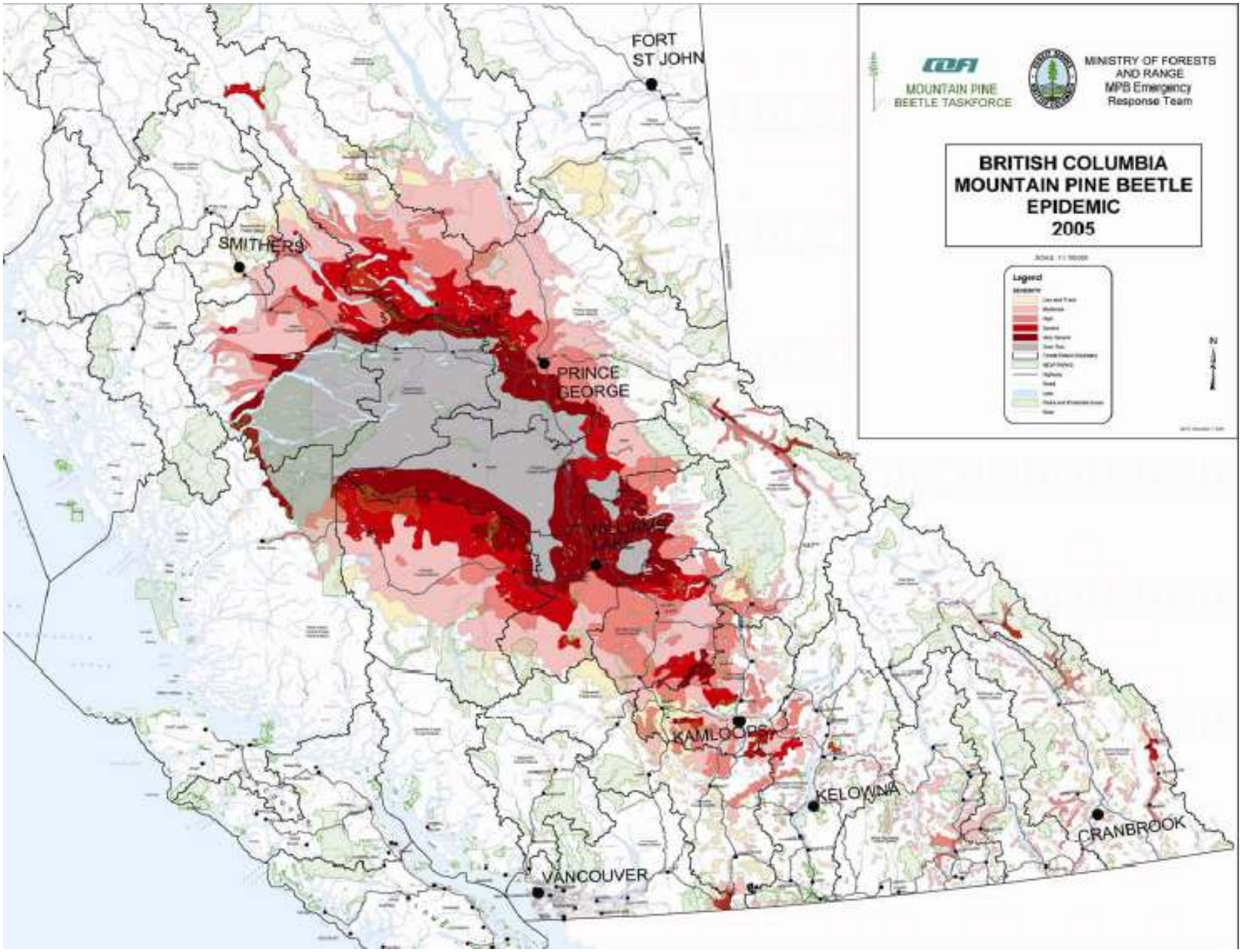
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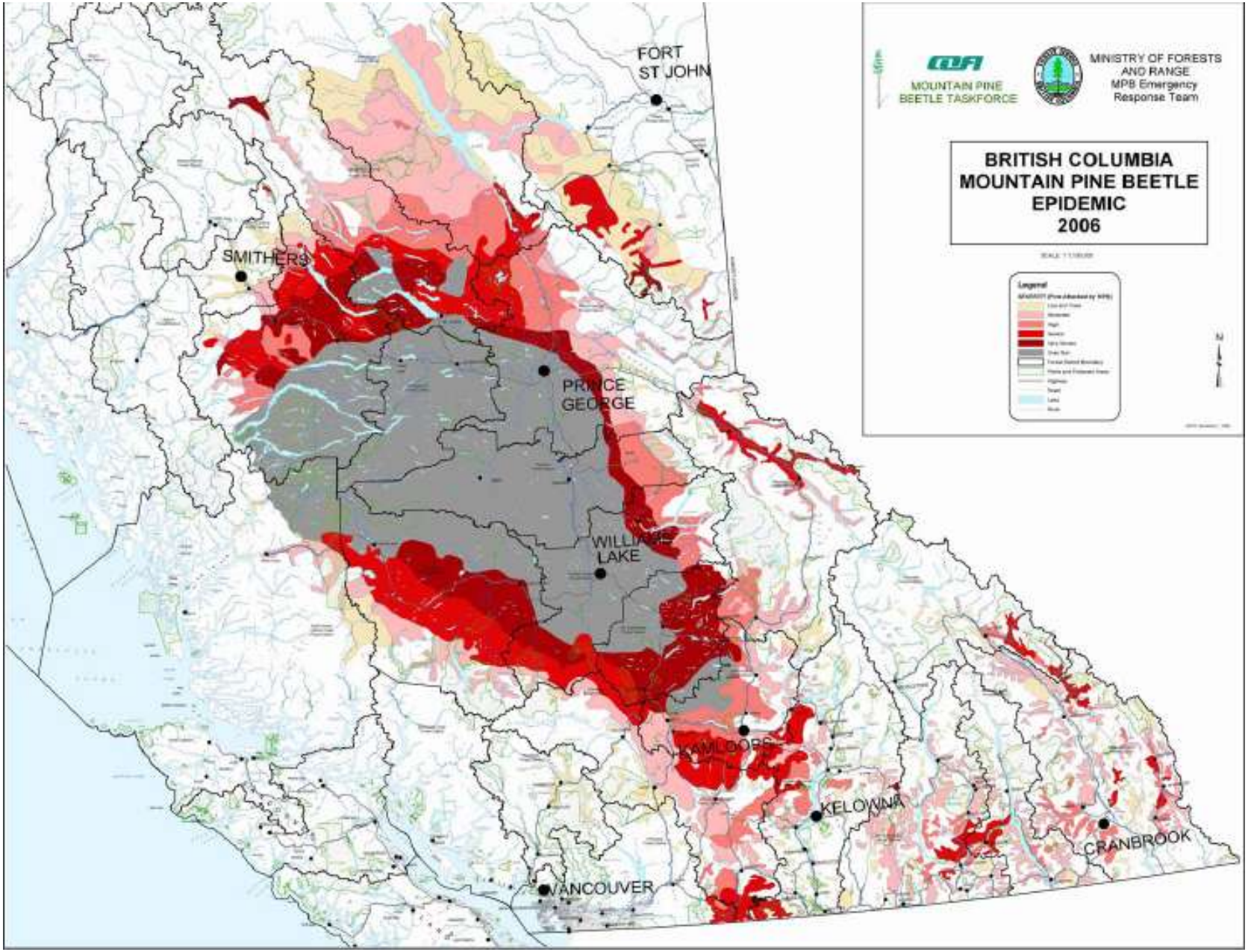
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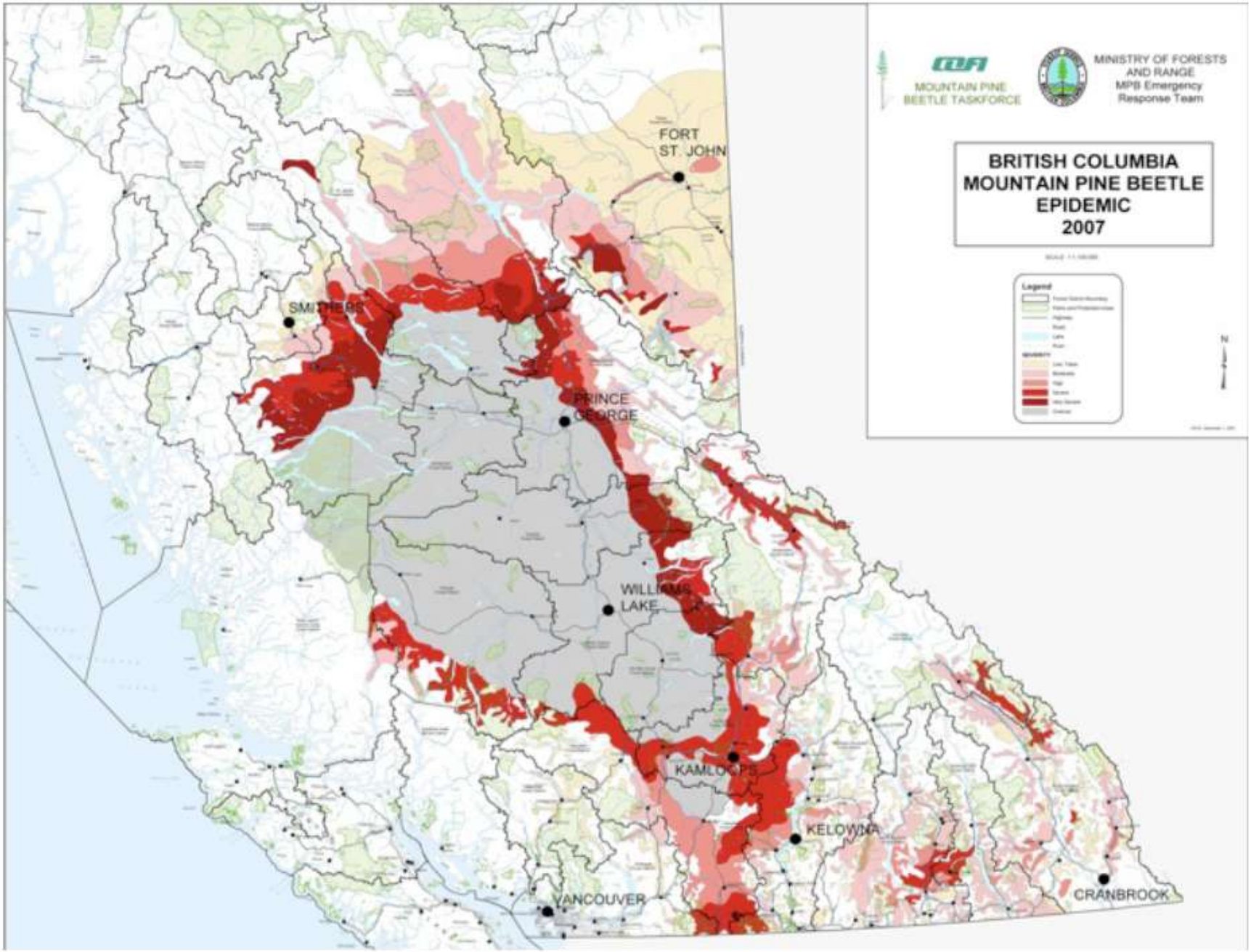
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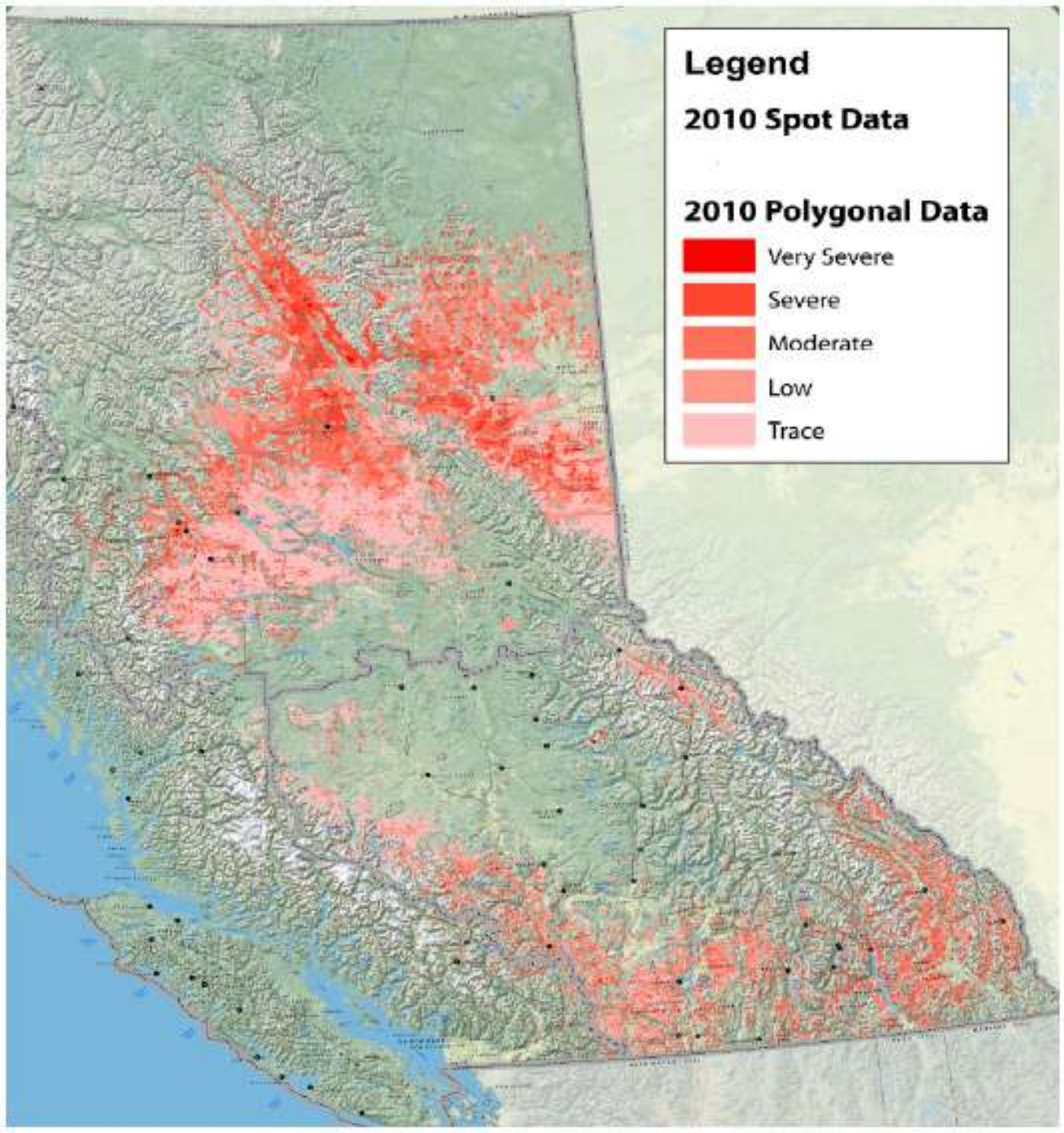


Mountain pine beetle infestations

recorded in British Columbia in 2010

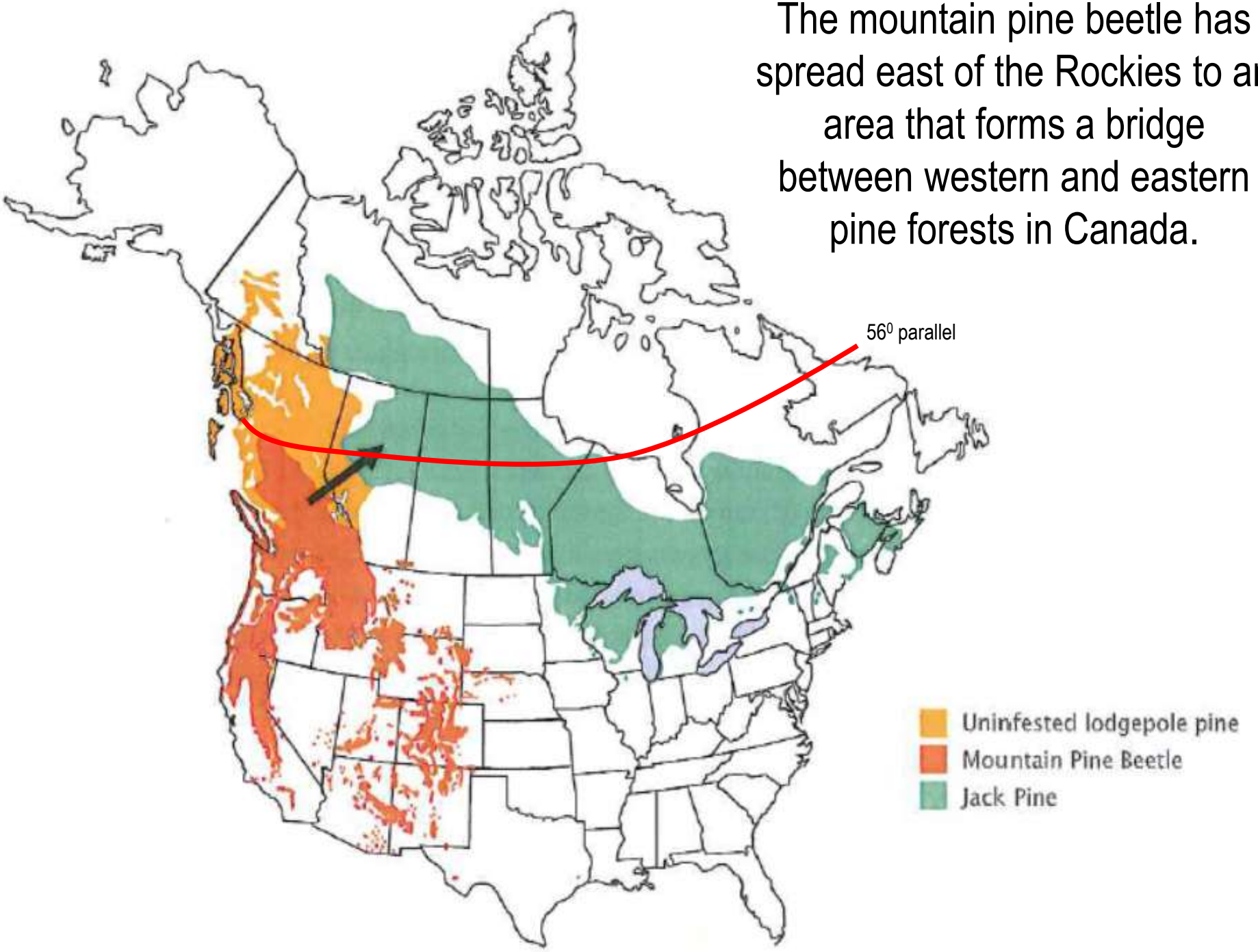
"Shows the leading edge of the Infestation"

“Mountain pine beetles now infesting jack pine; all of Canada at risk”

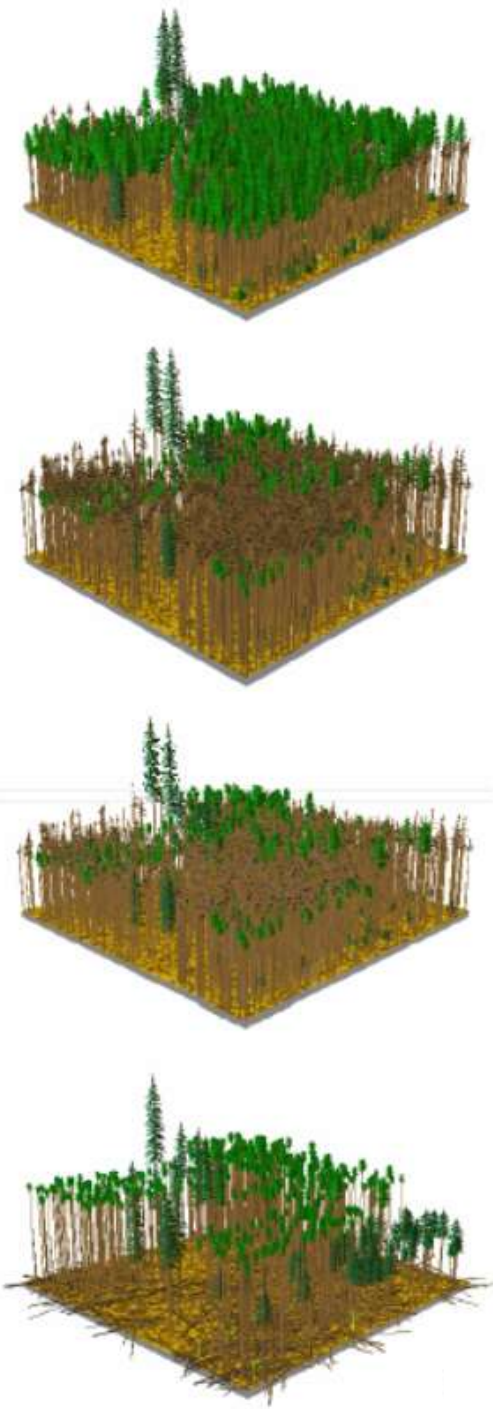
Species makes jump from lodgepole pine to jack pine: University of Alberta researchers

“The Mountain Pine Beetle is considered a Native invader north of the 56^0 parallel”

The mountain pine beetle has spread east of the Rockies to an area that forms a bridge between western and eastern pine forests in Canada.



Year:	
0	Green attack in summer, tree dies
1	Needles turn orange following spring
1-3	Needles turn red summer following attack Needles fall over 2-3 yrs
3-10	Small branches fall over 3-10 yrs
10-20	Dead boles fall in 10-20 yrs Large surface fuel accumulation Regeneration of residual stand



Red Stage MPB Infested areas

- Large fires with rapid rates of spread
- Huge safety concerns for fire fighters
  - Fuel reacts quickly to changes in relative humidity(RH)
- Large tracts of timber lost to these fires
- Good regeneration response to these fires in certain forest types
- Industry response to infestation was quick and harvest levels up to multiple times the AAC
  - Leads to post harvest debris management problems

“Standing Grass”

Grey Stage MPB Infested areas

- Various stages within the new fuel complex
  - Deciduous understory – Alder and willow component
  - Sparse understory – herbaceous forest floor
  - Conifer understory – age, ability to release?
    - Seen as the mid term timber supply
- Starting to see fall down occurring – Sapwood rot in lower portion of many trees
- Seeing drier surface fuel with the loss of the overstory shading

"Standing Slash"

Varying Stand Conditions

Lush green herbaceous material (Low fire risk)

Absent understory (Surface fire – may have fast rate of spread, higher intensity from increased surface loading)

Conifer understory (Fast rate of spread, High Spotting Potential)

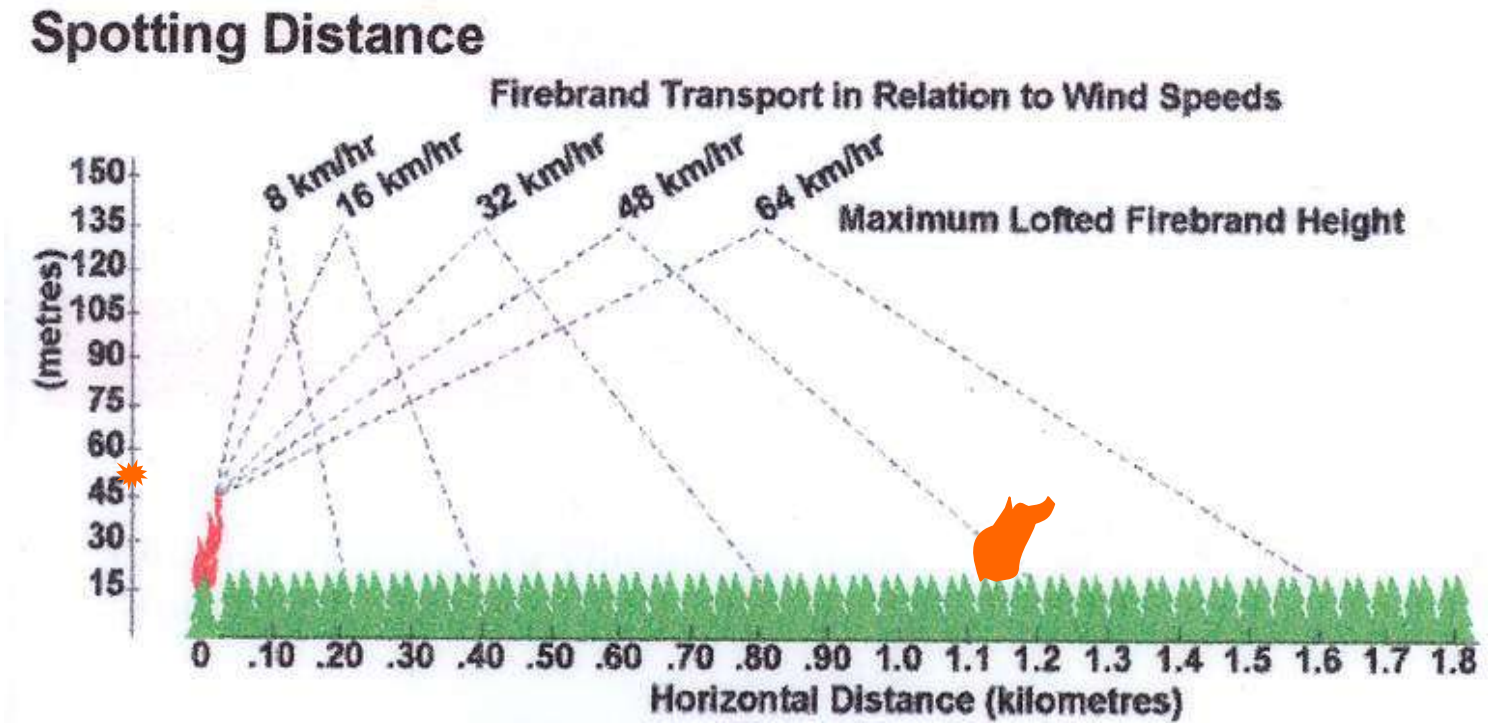
Greer Creek Video Footage June 19th

Spot Fires

In the MPB Killed Stands, Grey Stage, we are observing:

- More fuel being consumed = higher fire intensity = more convective lift
- More convective lift = higher lofted firebrand height = more potential for horizontal drift
- More horizontal drift = longer spotting distances

Green Forest model



We must also consider the increase in Firebrand size and residual burn out time of that material

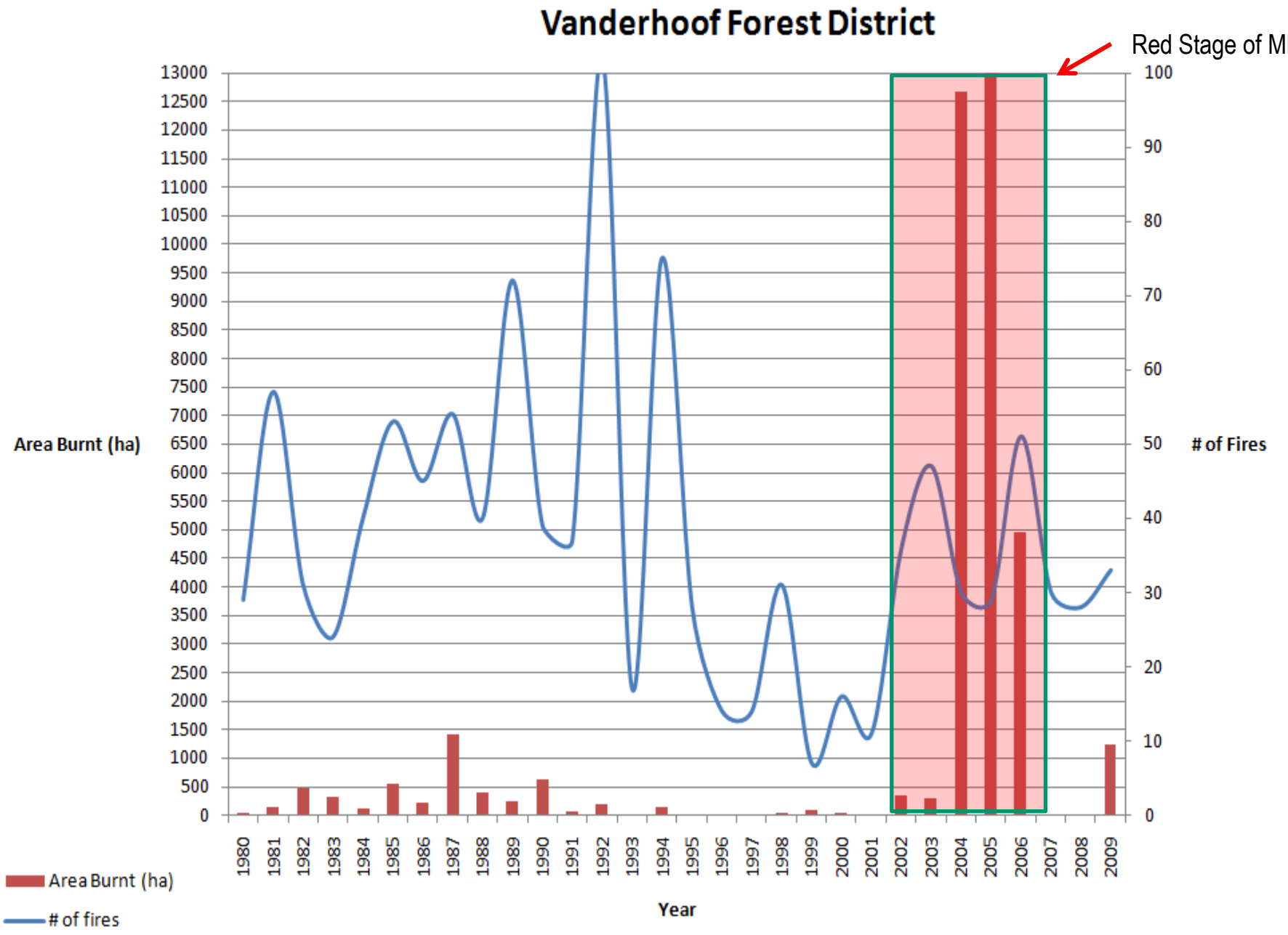
- Green forest – needle, bark flakes and small twigs
- Grey Forest – slabs of bark (baseball cap in size)

Harvest activities are leaving large areas of receptive fuel beds for spotting material to ignite in

The effect of Mountain Pine Beetle on fire activity

Fire Year	# of fires	Ha burnt	Acres burnt
2010	1673	339 889.0	839 525.8
2009 *	3064	247 419.0	611 124.9
5 year average	1003	39 107.0	96 594.3
10 year average	1391	70 464.0	174 046.1

* In 2009 , 4.9% of total wildfires were in MPB-affected areas, but these fires burned 56% of the total area burned that year



Average / year = 37 fires and 1259.4 ha

Forest Renewal

- Study began in 2005
  - Established 50 plots in MPB killed stands in the Prince George Timber Supply area
  - The stand criteria was greater than 70% pine by composition and greater than 80 years old
    - 30 in moist pine sites
    - 10 in MPB killed stands affected by wildfire
    - 10 in dry pine sites

Data from Craig Delong,
Research Ecologist, MNRO

Forest Renewal

- The project was to examine:
  - Fall down rates of the MPB killed stands
  - Advanced regeneration and growth rate of this regeneration
  - Change in stand structure and habitat features (biodiversity values)
  - Lichen survival and growth (caribou habitat)

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Forest Renewal

- 2010 plot re measurement results of the 30 moist pine sites:
  - 20% fall down from 2005, average of 5% per year, in line with what was previously seen in green stands. Expect this to increase quickly in the future.
  - 24 of the 30 plots have greater than 500 stems per ha
    - Equal in size to a 20 year old plantation (height and diameter)
    - The trees are releasing (increase in leader growth)
  - As the dead pine falls down we are losing timber value but biodiversity value is increasing

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Environmental Changes

- Temperature change of +0.5^{0}C – +2^{0}C/ 0.9^{0}F- 2.6^{0}F.
- Precipitation change of -0.5% - +2.0%.
- Length of fire season changing. Fire season has increased in length by 3 weeks in the past 10 years
- Everyone is in agreement that we are seeing fuel complex change
- Successional changes. What will the new forest look like?
- Harvesting of over 230 million m^3 of beetle killed timber.
  - Post harvest debris issues
- How will we deal with fire in the fall down stage
  - Fire Fighter safety issues
  - Suppression tactics

Community Survival

- British Columbia is a resource based economy and forestry is one of the largest driver of this sector of the economy.
- Need to find market for lower grades of lumber
  - The development of the Asian market
- New markets for dead trees
  - Wood pellets
  - Bio energy
- Diversity community reliance on forestry as a stronghold of the community
- Have the “strength” to maintain the course in forest stewardship
  - MPB attack is unprecedented, but it is a natural process in the forests of BC

Issues – Public and Fire fighter safety

- Need to develop/ quantify a fuel model for fire behaviour predictions
- Manage self imposed hype of the potential fire behaviour of this fuel type
- After Greer Creek fire – public push to remove all grey stands
- Is the grey stage worst than the green forest?
- Biodiversity
- Critically dry fuel 6-8% standing and down
- Convective energy, spotting potential (size and distance)

Issues – Political and Industry Pressures

- Pressures to protect plantations and mid term timber supply
- Trees are dollar signs, pressure to protect them all!!
- Fire is a natural process, are all fires bad??
- Public perspective
  - We are supposed to suppress “all” fires
  - Has past suppression efforts led to this unprecedented outbreak?
- 2010 Cariboo Fire Center example - 5 fire complexes managing over 100 fires
  - Can we continue to spend at the rate we are now for suppression?

Future of fire in MPB Infested Stands

- Blowdown/ fall down
- Timber supply demand
- Increased post hazard fuel loads
- Climate Change
- Prescribed Burning/ Broadcast burning – Liability?
- Pro active fuel breaks


Where do we go from here?????

Thank You

BRITISH COLUMBIA
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Ministry of Forests, Lands, and Natural Resources Operations

http://bcwildfire.ca/

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